longest delay, the audio/video input device can delay the video stream in order to match with the audio played by the speakers.

[0082] In certain aspects, use-case adjustments include adjusting the timing (e.g., play at time) of the system based on changes in network topology or other audio source use case changes. Generally, latency values for a given device are static per build of the device. However, the redistribution modes or topologies chosen for a group of devices by the customer can change. Thus, the system latencies (e.g., longest latency) need to be calculated every time there is a change in the topology of the audio distribution system. Examples of system topology changes include adding Wi-Fi out-of-room speakers to a grouping, adding a Bluetooth out-loud speaker, adding a Bluetooth headphone, adding accessory speakers, and adding speakers to a left-right group, to provide some examples. In an aspect, each of these events can result in a change in the longest latency of the system, and thus, the latency needs to be re-determined (e.g., using method **300**).

[0083] In certain aspects, a master device, upon detecting a change in the topology of the audio distribution system, re-initiates the latency reporting and aggregation as discussed in accordance with aspects of the present disclosure, and re-calculates the longest system latency and the "play at time" for the changed topology. In an aspect, care is taken to only accept a new overall play-at-time depending on the type of topology change. For example, if a latency has changed due to a new speaker being added, and if the current stream is a WiFi stream (e.g. Spotify), the currently playing groups' audio playback is not interrupted. On the other hand when rendering a stream that requires a fixed latency with sufficient robustness, the software can choose to alter the "play at time", which induces a short-lived audio mute and resume at the new offset. If the master device decides to alter the "play at time", it further communicates the new adjusted "play at time" to the slave devices to be used in synchronized out of an audio stream.

[0084] In certain aspects, if a speaker responsible for the longest delay is dropped, there can be a benefit in re-calculating the longest latency and possibly switching to a lower longest latency, especially for audio for video lip sync purposes.

[0085] It may be noted that, descriptions of aspects of the present disclosure are presented above for purposes of illustration, but aspects of the present disclosure are not intended to be limited to any of the disclosed aspects. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the described aspects.

[0086] In the preceding, reference is made to aspects presented in this disclosure. However, the scope of the present disclosure is not limited to specific described aspects. Aspects of the present disclosure can take the form of an entirely hardware embodiment, an entirely software embodiment (including firmware, resident software, microcode, etc.) or an embodiment combining software and hardware aspects that can all generally be referred to herein as a "component," "circuit," "module" or "system." Furthermore, aspects of the present disclosure can take the form of a computer program product embodied in one or more computer readable medium(s) having computer readable program code embodied thereon.

[0087] Any combination of one or more computer readable medium(s) can be utilized. The computer readable medium can be a computer readable signal medium or a computer readable storage medium. A computer readable storage medium can be, for example, but not limited to, an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, or device, or any suitable combination of the foregoing. More specific examples a computer readable storage medium include: an electrical connection having one or more wires, a hard disk, a random access memory (RAM), a read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), an optical fiber, a portable compact disc read-only memory (CD-ROM), an optical storage device, a magnetic storage device, or any suitable combination of the foregoing. In the current context, a computer readable storage medium can be any tangible medium that can contain or store a program.

[0088] The flowchart and block diagrams in the Figures illustrate the architecture, functionality and operation of possible implementations of systems, methods and computer program products according to various aspects. In this regard, each block in the flowchart or block diagrams can represent a module, segment or portion of code, which comprises one or more executable instructions for implementing the specified logical function(s). In some alternative implementations the functions noted in the block can occur out of the order noted in the figures. For example, two blocks shown in succession can, in fact, be executed substantially concurrently, or the blocks can sometimes be executed in the reverse order, depending upon the functionality involved. Each block of the block diagrams and/or flowchart illustrations, and combinations of blocks in the block diagrams and/or flowchart illustrations can be implemented by special-purpose hardware-based systems that perform the specified functions or acts, or combinations of special purpose hardware and computer instructions. In an example implementation, such a special-purpose hardware-based system includes an audio device that includes one or more transducers.

What is claimed is:

1. A method of negotiating latency for a plurality of audio devices, the method comprising:

receiving information regarding an audio processing latency associated with each audio output device of a set of two or more audio output devices connected to a network;

determining, based at least on the received information, a maximum delay for outputting audio from the set of two or more audio output devices;

determining, based on the maximum delay, timing for outputting the audio from the set of two or more audio output devices; and

communicating the timing for outputting the audio to the set of two or more audio output devices to assist with synchronizing the audio output by the set of two or more audio output devices.

2. The method of claim **1**, wherein the maximum delay includes a maximum time taken for the audio to be received by a given audio output device of the set of two or more audio output devices and then output by at least one audio transducer of the given audio output device.